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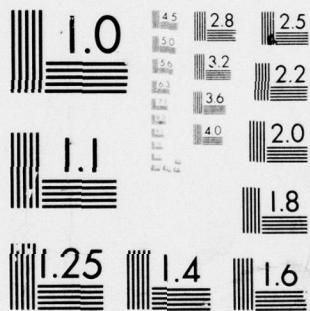


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EUROPEAN SCIENTIFIC NOTES

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London

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NEW UNSTABLE NEUTRAL PARTICLE

Evidence has been obtained at the University of Manchester for the existence of an unstable neutral particle with mass greater than that of a proton. This evidence was obtained from pictures taken at the Pic du Midi in a cloud chamber containing one lead plate in a strong magnetic field. Identification of tracks is made by momentum and ionization measurements.

R. Armenteros, K. H. Barker, C. C. Butler, A. Cachon and A. H. Chapman consider that two types of neutral V-particles exist, of different mass, and decaying according to the following two schemes:



Out of a total of 10,000 pictures, they found 50 V^0 decay forks and 10 V^{\pm} forks (some of the latter may be π - μ decays). Of the 26 V^0 decays which could be measured, they consider that perhaps 2/3 follow scheme 1 and 1/3 follow scheme 2. This conclusion is based on the fact that in the decay secondaries of neutral V particles they have definitely identified positive protons in four cases; however, many of the other positive secondaries measured could be protons as well. Of the negative secondaries measured, three have been identified as mesons, but none definitely as of protonic mass.

One case has just been found in which the decay occurs in the upper half of the chamber. A positive proton is definitely identified as a decay product; it

passes through the lead plate. A lightly ionizing negative particle passes through the lead plate and undergoes a sharp deflection in the bottom half of the chamber; on analysis this is found to be a π - μ decay. From a detailed analysis of these events the rest mass of the V^0 particle (scheme 1) is found to be 2200-2300 electron masses.

Six forks were found where the positive particle definitely is not a proton and two cases where neither can be a proton. This lends support to scheme 2 and gives a value for the mass of the V^0 particle of about 800-1000 electron masses (cf. ESN 4, 265 (1950)).

Work is progressing on this problem as more pictures are obtained and better statistics collected. In the very near future it is hoped that a much larger cloud chamber which is now being set up at the Jungfraujoch will go into operation and provide better opportunities for identifying the V particles and their decay products.

A more detailed account of some of these results is given in Nature 167, 501 (1951).

THE POSITIVE EXCESS OF μ -MESONS AT SEA LEVEL

An investigation has been carried out by B. G. Owen and J. G. Wilson at the University of Manchester with the magnetic spectrograph (Hyams et al, Proc. Phys. Soc. 43, 1053 (1950)) on the positive-negative charge ratio of near-vertical μ -mesons at sea level. They show that the ratio increases with meson momentum from about 1.17 at 1×10^3 Mev/c, up to about 1.26 at 4×10^3 Mev/c. At still higher momenta, the statistical accuracy of the measured charge ratio is limited by the instrumental rate of collection and it cannot yet be definitely decided whether the charge ratio goes through a maximum, although the evidence now available favors a slow decrease at the highest momenta.

These results, which will be published soon in the Proc. Phys. Soc., are considerably at variance with most previous measurements of the charge ratio. All

other measurements have shown much higher values, except for those of Nereson, who identified μ -mesons by means of the μ -e decay.

The Manchester workers have been able to confine their measurements purely to μ -mesons since protons were positively identified by studying the absorption of the particles in lead after traversal through the spectrograph.¹

Owen and Wilson interpret the lower value at low momenta as due to the fact that neutrons become increasingly more important, compared to protons, in producing mesons of lower momenta in secondary nuclear collisions in the atmosphere. The possible decrease at high momenta could be accounted for if one assumes that the multiplicity of meson production increases with the energy of the mesons produced.

PHASE CONTRAST MEASUREMENT OF SMALL REFRACTIVE DIFFERENCES

Dr. Erik Ingelstam of the Royal Institute of Technology in Stockholm has recently applied the method of phase contrast to the measurement of small refractive differences in liquids. The light source is an illuminated slit. The cell under study is made of two plano-convex lenses with their plane sides towards each other. These lenses form an image of the source slit on an oblique mirror of glass, coated with aluminum except for a narrow groove exactly at the image of the source slit. The direct beam is reflected from the bare glass surface at the Brewsterian angle, while the diffracted light is reflected from the surrounding aluminum. This is a method first described by Francon and Nomarski (*Revue d'Optique* 29, 619 (1950)). The thickness of the aluminum determines the phase difference introduced between the two beams while a polarizer in the field varies their relative intensity. A camera lens or telescope behind this phase mirror is focused on the cell under observation.

¹ (Myrolo and Wilson have found a differential momentum spectrum for protons between 1 and 5×10^3 Mev/c at sea level of the form $p^{-2.8} dp$ (in preparation for publication))

With this apparatus Dr. Ingelstam estimates that he is able to detect phase differences of about 50 Å. This corresponds to a difference in refractive index of 5 parts in the 6th place when measurement is made in a 10 mm cell. In experiments on glycine it has been possible to measure concentrations of 0.002 percent in water. A mixture of 10^{-4} parts heavy water in ordinary water can be detected.

It is very difficult to make absolute quantitative measurements of phase contrast effects, so Dr. Ingelstam has chosen to make all measurements relative to the phase disturbance produced by a set of standard striations. The striations are evaporated strips of magnesium fluoride whose thickness is measured by the method of multiple beam interference. Striations are used producing path differences from 45-600 Å. By this method he has been able to make measurements to within about 5 percent. It is proposed to apply this technique to the measurement of the small refractive index differences found in electrophoresis, sedimentation and diffusion experiments.

DISTANCE MEASURING DEVICE

Dr. Erik Bergstrand of the Swedish Geographical Survey (Rikets Allmänna Kartverk) in Stockholm has recently described a device for the precise measurement of geographical distances by optical means (Arkiv för Fysik 2, 119 (1950)). The instrument uses a beam of light modulated at 10 megacycles by a Kerr cell. The Kerr cell is biased by 5000 volts whose polarity is changed at 50 cycles. The signal is reflected from a plane mirror at a distant point and focused on a photomultiplier tube. The photomultiplier tube sensitivity fluctuates with the same high frequency which is impressed on the Kerr cell. Signals received during the two halves of the bias cycle are balanced against each other for a null. The presence of such a null indicates that the distance from the source to the mirror is an integral number of quarter wavelengths. Unknown phase lags within the instrument are eliminated by calibrating against a known short distance.

Bergstrand's instrument has now been redesigned for commercial production by the AGA Company of Lidingö, Sweden. In the new device the balance point is found by adjustment of a variable electrical delay, rather than by varying the frequency as in Bergstrand's original instrument. The electrical delay line is calibrated against a compact folded optical system whose total length can be adjusted for any distance up to 19 metres. The use of a fixed crystal-controlled oscillator enables very high precision to be obtained. Using the new instrument on a newly surveyed base line, Bergstrand has again found the same answer for the velocity of light reduced to vacuum, $c = 299,793.1 \pm 0.25$ kilometres per second.

With the new instrument it is possible to measure distances up to 30 km with an accuracy of a few centimetres. Since this compares favorably with orthodox surveying methods, it should be possible largely to eliminate tedious direct measurements of base lines. It is also possible, with the new instrument, to make accurate measurement across open water or impassable terrain.

POLARIZATION OF EXTRA-GALACTIC LIGHT

Mrs. Aina Elvius has recently made measurements in the Stockholm Observatory at Saltsjöbaden, Sweden, on the polarization of the light emitted by the extra-galactic nebula NGC 5055. For these experiments she has used an instrument developed by Dr. Yngve Öhman, described in the *Stockholms Observatorium Ålmanntä, 14, 3* (1942). This instrument uses a coarse grating of metallic bars in front of a double image prism and an image-forming lens. The resultant picture of the object contains parallel strips having opposite states of polarization. The polarization is determined by photometric traces made on the picture. Mrs. Elvius has studied six dark areas in the nebula, in each case making measurements at a number of different angles to determine the orientation of the polarization. Polarization up to 7.4 percent is found. The electric vector of the light is oriented predominantly at right angles to the radii of the nebula at the points of measurement.

This result is compatible with the results of Hall and Miksel, of the U.S. Naval Observatory, in measurements within our own galaxy. There too, the

electric vector of the light passing through the interstellar space within the galaxy was found to be polarized predominantly parallel to the plane of the galaxy. The explanation of the results obtained by Hall is that the polarization is caused by the absorption of light by oriented obscuring particles. The same phenomenon may explain the results on NGC 5055. The alternative explanation, that the effect is caused by scattering of light from the luminous center of the nebular, is being studied by measurement of the wavelength dependence of the results.

SPECTROGRAPH FOR ANALYSIS OF MIXTURES

Unicam Instruments Ltd., Cambridge, England, showed at the 35th Physical Society Exhibition a new "Spectrocomparator" for the analysis and control of organic chemical mixtures whose constituents are known. The instrument is essentially a double-beam spectrograph with cathode ray presentation, using a spectral range in the near infra-red from 1-3.5 microns. The receiver is a lead sulphide cell. The two beams are interchanged at 1500 cycles per second by means of a mirror mounted on a magnetically driven torsion bar. The spectrum is scanned by moving the Littrow mirror electrically in a 10 cycle saw tooth motion. The central wave-length and the spectral width can both be varied electrically. It is planned that the instrument will be used for the analysis of organic mixtures by circulating the unknown in one beam while adjusting a set of variable thickness cells containing pure compounds in the other beam. The complete elimination of absorption bands in the indicated spectrum shows that the two beams are spectrally identical. The composition of the unknown can then be read directly from the variable thickness cells. It is estimated that the new instrument will be on the market late this year.

RETINAL VESSEL DEVELOPMENT IN LOW ATMOSPHERIC PRESSURES

Dr. F. W. Campbell of the Institute of Physiology, University of Glasgow, Scotland, reported his studies at the recent Ophthalmological Congress held in England on the "Influence of a low atmospheric pressure on the development of the retinal vessels in the rat".

In noting a capillary free space along retinal arteries of young rats, Campbell postulated that the higher oxygen tensions existing around retinal arteries may further inhibit expansion of capillaries during growth and development of the animal.

Young rats, 24-30 hours old, were placed in a low pressure chamber at about 17,500 feet. This altitude is equivalent to a partial oxygen tension of 76 mm Hg in the air of the chamber.

After varying periods of exposure, the animals were removed from the chamber and deeply anesthetized and the hearts exposed. A 50 percent solution of Reeves Indian ink in saline was injected into the left ventricle until the head and neck of the young rats became jet black. The eyes were then enucleated and placed in 10 percent formalin for 24-48 hours. The retina, after separation from the choroid, was placed on a microscope slide and dimensions of the capillary network were taken.

A decrease in caliber of retinal vessels, veins and capillaries was found in all rats subjected to low pressures for 64 hours or longer. The capillary free zone in control animals was 14μ smaller than in the low pressure group. The low pressure conditions decreased the rate with which the vessels grow from the optic disk to the periphery.

Since growth of animals was markedly reduced by such long periods of exposure to low pressures, age, body weight and extent of retinal vascularization were analyzed by means of multiple regression. Using this method it was found that the rate of vessel growth had decreased from $8.8 \mu/\text{hr.}$ of age in the control group to $7.2 \mu/\text{hr.}$ in the low pressure group.

The low pressure environmental conditions produced in this experiment resulted in three dominant changes in the mode of retinal vessel development in the rat;

- (1) Capillaries first formed develop more rapidly toward the definitive type found in the adult rat,

- (2) Capillary free zones normally found around the arteries is narrower,
- (3) Rate of vascularization of the retina is diminished.

This technique provides a simplified method for the study of the factors influencing morphogenesis of the retinal vessels and suggests that the retina itself may be satisfactorily used as an ideal site for the study of the growth of the peripheral vascular system.

THE CIBA FOUNDATION

The Ciba Foundation for the Promotion of International Cooperation in Medical and Chemical Research in London was formally opened by Sir Henry Dale on 22 June 1949. It was established under English law as a charitable trust by the founder, Ciba Limited, Basle. The Trustees, who are responsible for the independent administration of the Foundation, are Professor E. D. Adrian, O.M., P.R.S.; The Right Honorable Lord Beveridge, K.C.B., F.B.A.; The Right Honorable Lord Horder, G.C.V.O., M.D., F.R.C.P.; and Mr. Raymond Needham, K.C. The Foundation is under the immediate direction of Dr. G.E.W. Wolstenholme, O.B.E., Secretary to the Executive Council.

There is an Advisory Panel consisting of at present 29 eminent scientists of 10 countries. In addition to the countries represented on the Advisory Panel, other parts of the world will be represented by correspondents, who will be invited to act in an advisory capacity in regard to local or national research.

The Foundation is located at 41 Portland Place, London, W.1, in a commodious, five-story house, well equipped with rooms for large and small conferences, reception rooms, library, and bedrooms on top two floors where visiting scientists and their wives can be accommodated during their stay in London.

The purpose of the Foundation was well stated by Lord Beveridge, who, at the time of the opening, observed, "This place itself is not a laboratory for

mixing compounds, but we do mean to make it a place where the people who are working on research can meet together to discuss their problems . . . in pleasant and comfortable surroundings."

In the first 18 months some 1,800 people, active in medical and chemical research, have attended conferences, lectures, debates, etc., at the Ciba Foundation or through its offices have visited research centers, given lectures, or attended meetings in London, and of these nearly 500 have been given lodging accommodations for one or more nights.

Eleven important conferences have been held at Ciba House to date. These 2-4 day conferences are restricted to participating members, who are invited solely on the basis of their individual ability to contribute of their knowledge and experience to the conference. The size of the conferences has varied from 20 to 85 participants. Accent has been placed on steroid compounds, as is evident in following list of the conferences:

CONFERENCES 1950

<u>Subject</u>	<u>Date</u>
Toxaemias of Pregnancy	12-14 January
Administration and Dosage of Steroid Hormones and Related Compounds	23-24 February
The Interaction of Steroid Hormones and Enzymes	9-10 March
Nomenclature of Steroids	30 May-1 June
The Effects of Steroid Hormones and Related Substances on Tumor Growth	10-12 July
Liver Disease	17-18 July
Estimation of Steroids in Body Fluids, and of their Excretory Products	- 31 July-2 August
Metabolic Breakdown of Steroids	9-11 August

CONFERENCES 1951

<u>Subject</u>	<u>Date</u>
The Effect of Steroids on Local and General Water Distribution	8-12 January
Use of Tracer Isotopes in Steroid Chemistry and Biological Investigation	12-15 March
Influence of Steroid Hormones on Psychological and Behavioral Reactions	9-12 April

The reports of these conferences are being published. "Toxemias of Pregnancy - Human and Veterinary" has been published by J. and A. Churchill Ltd., London, and will be published in the United States by Blakiston Company of Philadelphia. The proceedings of the July conference will be published shortly under the title "Liver Disease" by J. and A. Churchill. Editing of the other conferences has not been completed.

The first Ciba Foundation lecture, "The Analogue as an Instrument in Biological Research", by E. C. Dodds, Courtauld Professor of Biochemistry, University of London, was given on 8 December 1949. The second Foundation Lecture, "The Role of Suprarenal Cortical Function in Disorders of Childhood", by Sir C. Stanton Hicks, Professor of Pharmacology and Physiology in the University of Adelaide, was given on the 12th of December, 1950.

In addition to organizing conferences and sponsoring the annual lectures, Ciba Foundation has been host for many medical and scientific society meetings.

Looking ahead, two important conferences are scheduled for July. The conference entitled "Control of the Anterior Pituitary, and the Reciprocal Relationships between its Secretions and those of Target Organs" will be held July 9-13 with Dr. A. S. Parkes (London) as chairman. A conference on "Visceral Circulation" will meet July 23-25.

SALMONELLA DUBLIN IN A HUMAN CARRIER

Surgeon Commander W. S. Miller, RN, working at the U.S. Naval Medical Research Unit No. 3, Cairo, Egypt, has recently reported a human carrier of Salmonella dublin in which the organism was obtained from urine for over one year.

This is the first known record of a chronic human carrier of this pathogenic micro-organism. S. dublin appears to be particularly common in cattle and foxes and raw milk obtained from infected cows is the usual vehicle for human infections.

The presence of such organisms in a human carrier would indicate that man may play a more important role in the dissemination of S. dublin infections than has previously been thought.

Details of this work will be found in Report NM 005 050.09.02, obtainable from the Commanding Officer, NAMRU No. 3. An article has been submitted for publication in the British Medical Journal.

NEW OPTICAL INSTITUTE

A new Institute of Optics (Optikmännchen) has recently been founded at the Royal Institute of Technology (Kungl. Tekniska Högskolan) in Stockholm. The director of the Institute is Dr. E. Ingelstam. He is assisted at present by Mr. P. Lindberg and Mr. E. Djurle.

During the last year, 14 reports and 7 publications have been issued from the laboratory. Among the topics treated are techniques for determining the properties of optical gratings, procedures for the examination of camera lenses, wind tunnel optics, the interference examination of surfaces and standards of surface finish, a photoelectric grating spectrograph, and phase contrast studies of refractive index differences in liquids. Copies of some of the reports are available from the Director of the laboratory.

CONFERENCE ON DIELECTRICS

A conference on Dielectrics will be held at the University of Liverpool 23-25 July, 1951, under the sponsorship of the Departments of Theoretical Physics and Extramural Studies of the University, in cooperation with the Institute of Physics and the British Electrical and Allied Industries Research Association. The experimental and theoretical aspects of dielectric loss, relation between dielectric properties and chemical structure, phase transitions, ferro-electrics, and breakdown will be discussed. There will be a survey on each group of subjects, followed by presentation and discussion of original papers.

Information about the conference can be obtained by writing Mr. T. Kelly, Director of Extramural Studies, University of Liverpool.

REPORT ON PNEUMOCONIOSIS

The Medical Research Council Report No. 25 on "The Social Consequences of Pneumoconiosis among Coalminers in South Wales" has just been published. Copies are available from His Majesty's Stationery Office, 429 Oxford Street, London, W.1, at a cost of one shilling, nine pence net.

PERSONAL NEWS ITEM

Dr. E.A.R. Braude, Imperial College, London, has been awarded the Meldola Medal for 1950. This medal is presented annually to the British chemist, under 30 years of age, who shows the most promise as indicated by his published works.

FORTHCOMING EVENTS

The meeting of the General Assembly of the International Astronomical Union, which was to be held in Leningrad on 1-8 August, 1951, has been postponed indefinitely.

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